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and repulsive and perhaps haunted by evil spirits—places to be crossed only under direst necessity—such feelings did not last. It was the less imaginative and more business-like Romans who never were able to conquer their earlier feelings of aversion towards mountain scenery; poets like Catullus and Vergil, born and reared in sight of the Alps, scarcely mention them. But the Greeks, through long familiarity with their hills, soon lost their dread of them and in slow process of time began to look upon them with the kindlier feelings of sympathy and companionship, even if their poets did not stop to describe them in Wordsworthian detail. The reason for the absence of such descriptions, hinted at by Murray in the passage just quoted, lay deep in the psychology of the race, in the very nature of the Greek. Zimmern has shown that landscape poetry, like landscape painting, can only come into existence when a people is able to see itself objectively in its surroundings and no longer feel itself part and parcel of them. Though they had long speculated upon the inner nature of man, the Greeks, up to the close of the fifth century B. C., if not later, had not fully entered upon the stage of self-consciousness in their attitude toward their natural environment. Hard it is for us moderns, sophisticated by all the centuries that lie between us and the Greeks and forever denied the simplicity and freshness of view of that wonderful race, to understand this. For our view of nature is relatively objective while theirs was subjective. As Zimmern puts it: "Like all simple folk, they take a knowledge of their scenery and surroundings for granted in all who listen to them. The Mediterranean landscape, like the institution of the city-state, forms a permanent background to Greek life and thought. Its influence is omnipresent, but it is seldom expressed"².

Professor Hyde's paper is reinforced by 178 footnotes, giving abundant references to the Greek writers, and to modern works on Greek geography. The paper is also beautifully illustrated with views of Greek mountains.

C. K.

SECOND YEAR LATIN AND SOME ASPECTS OF THE WORLD WAR¹

In these days of war activities, when the history teacher is teaching war and the English teacher is demanding themes on war, the Latin teacher naturally asks, 'What shall I do?' The very name of Caesar suggests war; and at this time, when we think war, hear war, eat war, and know that some of our pupils are already feeling the hardships of it, how can we refrain from the discussions that are naturally precipitated by the text we are reading? I do not expect to offer to teachers new material for the teaching of Caesar and, needless to say, I shall not attempt to give expert military information, but I propose to show how the teacher of Latin can use the present opportunity to make Caesar's campaigns real reports from real battlefields in which pupils are now vitally interested.

²Compare Professor Hyde's paper, *The Ancient Appreciation of Mountain Scenery*, *The Classical Journal* 11.70-84. Kindred, too, to the themes discussed in this issue is a very suggestive paper, entitled *Fortunatus Et Ille*, by Professor Tenney Frank, *The Classical Journal* 12.482-494, in which the writer discusses the attitude of the Greeks and the Romans toward nature, and seeks to explain the absence from their poetry of descriptions of nature.

¹This paper was read at the Twelfth Annual Meeting of The Classical Association of the Atlantic States, held at the Drexel Institute, Philadelphia, May 4, 1918.

The introductory lesson to the Gallic Wars is usually a geography lesson. To-day, the mere presentation of a map of Gaul to any class of American boys and girls awakens keen interest. At once they try to locate the Western Front. Then they are willing to trace the *tres partes* of ancient Gaul, and are rather eager to learn something about the people who lived in this country that seems so near to them now. 'Are the French the descendants of the Gauls?', and 'Are they like the Gauls?', are some of the questions put to the teacher. Here is the teacher's opportunity to tell his class that they are to have the privilege of answering these questions as they read Caesar's Gallic Wars.

We shall now, for a few minutes, take the pupil's point of view and try to answer some of his questions. First, we shall study the character of the Gauls and then we shall decide whether we think the French are their descendants.

Perhaps one of the first impressions is that the Gauls were a freedom-loving people. The desire to be free, it may be, enabled Dumnorix to foresee in Caesar a future conqueror and made him develop into the scoundrel that Caesar paints. Pupils readily take Caesar's opinion of this interesting revolutionist, and to many the death scene in which he calls upon his retainers to witness that he is a free man of a free people reveals for the first time the motives underlying his conduct, and makes him appear as one of the pioneers of Gallic independence. The Belgae object to the continued presence of the Germans in Gaul, but they as strongly object to the presence of Caesar's army. They are not arrayed particularly against the Germans, but they are guarding their land against foreign invaders. Again and again, particularly in Book 7, the Gauls urge the preservation of liberty as one of their chief duties, and the struggle for independence culminates in the courageous work of Vercingetorix. It is this same love of freedom, which has seemed to live in the land of France, that has made possible for the French people their great Republic and enables them now to furnish inspiration to us and to other nations in our fight for democracy.

Pupils like to find points of similarity, but they feel as if they have achieved even more by finding points of difference. One of the questions sure to come is this, 'The Gauls were not as brave as the modern French, were they?' This immediately provokes a discussion and illustrations are given of Gallic bravery; for instance, the battle of the Aisne, the resistance of the Nervii, and the conduct of the Piso brothers are cited, and, of course, the seventh book of the Gallic Wars furnishes a strong defense of the bravery of the Gauls. Caesar's victorious march through the territory of the Belgae is compared with the German invasion of Belgium and Northern France, and these are some of the questions that have been discussed: 'Was it worth while for any tribe to hold out against Caesar?'; 'Did the reputation for bravery won by the Nervii compensate for the loss of life?'

The *mobilitas* of the ancient Gauls is sure to bring comparison, and the fifth chapter of the fourth book causes a good deal of comment. Caesar there makes a serious charge, in that he says the Gauls are not to be trusted. Surely, the French of to-day are trustworthy, but here somebody states that the 'French are civilized and the Gauls were not'. One girl volunteers that 'fickleness is characteristic of a mob, and in a mob civilization is apparently lacking'. Another even thinks far enough to say that 'perhaps the Gallic willingness to change and their interest in strangers helped to bring about the present high state of French civilization'.

Here, again, comes the question as to ancestry: 'Were the Gauls the ancestors of the French?' Of course, the answer is in the affirmative, but the dissimilarity in character is attributed largely to the Romanization of Gaul. Pupils have also discovered that Caesar himself learned from the Remi that the Belgae were descended from the Germans, and, therefore, they had some German traits of character. Somebody knows that the Norsemen brought a certain stability with them, and so we have our modern French—a people in whom are blended the characteristics of several peoples. Pupils, however, should not be allowed to think that this is a complete discussion of the ancestry of the French; they should be told that they have only made a beginning. In spite of this varied make-up, pupils like to trace the loyalty of the French back to the loyalty of the ancient Gauls to their chiefs, for 'Gallic custom esteemed it shameful for retainers to desert their lords even when all was lost'.

American admiration for the French conduct of the World War makes the Gallic conduct of war an easy topic to discuss. In connection with Caesar's encampment upon the banks of the Aisne, a question from the teacher concerning the recent battle on the same river will lead to a comparison of Caesar's battlefield and our battlefield. 'It is exactly the same country', some one remarks. 'France and Belgium have had a hard time', is another comment. 'Did war at that time bring such devastation to a country as it does to-day?', will bring many answers. Somebody is quick to say, 'No, because they did not have the artillery that we have to-day'. 'What has that to do with the devastation?' comes from a slower, but thoughtful member of the class. The first girl is quick to reply 'that heavy artillery ruins the land', whereupon numbers of pupils name the 'tank' and motor trucks as destructive to land. From a far corner of the room is heard the question, 'Do not trenches break up the land more than anything that the ancient people had?' In spite of the fact that one objector urges that Caesar's trenches around his camp cut up the land and that he pitched camp every time he stopped, the general expression of opinion is that the girl in the corner is right, but that the trench is only one of the many things which necessarily devastate the country in the present war. 'The Germans have done so much harm that was not neces-

sary', interposes one pupil; 'so did Caesar', says somebody else, and thus starts an argument.

That shipbuilding was a problem in the Gallic Wars is interesting, and pupils in their naive way wonder whether Mr. Schwab and the other men in charge of shipbuilding have been inspired in their plans by the speedy and successful preparations of the Romans to fight the Veneti. Pupils derive much pleasure also from this particular campaign by finding in the French the same adaptability that enabled the Veneti to make ships adapted to the sea in which they were to sail.

That the Gauls were also masters of the food situation is evidenced by frequent references to it. We feel quite as if we were reading a daily paper when we read that Vercingetorix has commandeered all the food and that he has drafted all the men who are of an age to bear arms. The fact that the food administrator has also control of the draft causes much speculation as to whether his duties were as numerous as Mr. Hoover's. Vercingetorix's opinion of the permanency of Caesar's peace may be quoted as our opinion concerning the peace proposed by the Imperial German Government, and, so for many reasons, we feel a certain friendly interest in these Gauls who had so many of the difficulties and some of the traits of our allies, the French.

No less interesting is the comparison of Caesar's Germans with the Germans of to-day. Is William II the first German to demand 'a place in the sun?' Is it a new claim that the Germans do not wage an offensive war? Such questions as these put to a class will stimulate comparison, inspire interest, and develop power that might otherwise lie dormant. A pleasing and also a helpful exercise is to allow the class to substitute the name of William II for that of Ariovistus. Ask them to see whether they are startled by anything that they read and at the same time to decide to what extent the ideas and the principles of the Germans have changed.

After reading the description of the Suevi, the teacher asked her class to look through the account and see whether they considered 'German efficiency' really new. It was soon discovered that the ancient Germans were able to farm and to fight at the same time and that they were able to do both well. The statement was made that 'Caesar himself speaks for the farmers when he says "Reliqui, qui domi manserunt, se atque illos alunt"'. Another pupil quoted the Ubii to prove that the Suevi were successful warriors. 'Why were the Suevi proud that the fields on one side of them were unoccupied for six hundred miles?', was asked by one of the slower pupils. Among the several answers given was one that seems worth quoting: 'The Germans to-day do not want to allow small nations to exist near them'. Another point given to prove the efficiency of the ancient Germans was the fact that they always used their own horses and they trained these animals to be useful, no matter how small and ill-shaped they were. The German thrift was also recognized in the admission of traders to their country, not that they desired any-

thing to be imported, but that they might have buyers. Thus, by definite reference to the text, pupils proved for themselves that the Suevi provided equally for war, agriculture, and trade. 'Does the prestige of the Suevi remind you of the prestige of any particular people in Germany to-day?', brought the prompt reply, 'Of the Prussians'; whereupon one of the class suggested that perhaps the Kaiser thought he had a right to claim divine aid since the Suevi had been described by the Ubii as people to whom not even the immortal gods were equal.

One of the topics which has probably always, even before the war, contributed largely to the interest of pupils in the Gallic Wars is the personality of the man Julius Caesar. Perhaps, the very same incidents are given to show the power of his personality that have always been given, but, in the light of present events, these incidents arouse a keener interest than ever before. Take, for instance, the panic in the Roman army during the campaign with Ariovistus. In present day phraseology, men even applied to Caesar for exemption. 'Could our soldiers in the darkest moments show such desperation as was shown in the Roman army?'; 'Could any general in the light of twentieth century civilization show greater wisdom at such a time than was shown by Caesar?', are questions that will start a discussion.

Pupils like to call Caesar's final message to Ariovistus his ultimatum, and they are pleased to find in Caesar a general who cannot be surpassed by any modern general, either in the treatment of his own soldiers or in his diplomatic dealings with an enemy. They discover for themselves the great generalship of Caesar in the control of his army and in the efficiency of his soldiers in many lines of work. In our discussion of the bridge this year, the question was asked, 'Why did Caesar send such a detailed account of this bridge to Rome?' Various answers were given. One girl said, 'He probably wanted to impress the Senate with some of the difficulties which he met'; another answered, 'He may have wanted to show how well he could do all kinds of things'. Then came the question, 'Did Caesar himself direct the bridge building or were there engineers in charge of it?' The amount of work necessary for its construction and the quickness with which the work was done gave proof of the efficiency of Caesar's army.

A comparison of armies usually brings little surprise, for it is expected that a military nation like the Germans will have points of likeness to the Roman army that a peace-loving nation like the Americans will not have. A question frequently asked is, 'Has the Kaiser read Caesar's account of the Gallic Wars?'

That Gaul suffered not only from the Germans, but also from Caesar, is most apparent to all young people who read the Gallic Wars, and that the Kaiser's treatment of the small nation closely resembles Caesar's treatment of the tribe does not surprise them, since most of them know that the Kaiser has taken Julius Caesar as a model.

The important part played by the cavalry in Caesar's army causes comment and calls attention to its comparative absence from our army. Somebody always volunteers with a good deal of pride that 'Our scouting is done by airplanes instead of by cavalymen'. Also, the girl interested in the Red Cross is sure to ask, 'Was there no provision for the wounded in Caesar's time?'

The account of the preparations for the battle with the Nervii brings to-day an interesting description of the preparations made by our soldiers for going 'Over the Top'. The gas mask is recognized as a return to defensive armor; but here, again, girls who feel as if they have taken a real part in the preparation of our men, by making front line packets, notice that no provision was made during the Roman preparations for the wounds that were sure to come.

The existence of rudimentary international law causes comment. Pupils are interested to find that there was a respect for boundaries between States, and they see for themselves that the Gauls were right in thinking that the wintering of a foreign army on their soil was sufficient reason for mobilizing. The war with the Veneti, Caesar says, was waged because the sacred rights of the ambassador had been violated. The question is always raised by classes as to whether this was Caesar's real reason; but, whether it was or not, the fact remains that the violation of the right of the ambassador was considered a breach of international law sufficiently great to provoke war.

Obsides will bristle with interest for boys and girls if they know that, both in Belgium and in France, the Germans have constantly taken and used hostages. One member of the class may give a special report from German War Practices, one of the pamphlets issued by the Committee on Public Information. For such an assignment there is plenty of material in this pamphlet, but, for illustration, I offer the following extract from a proclamation to the people of Rheims by the General commanding Rheims, September 12, 1914:

'In order to insure sufficiently the safety of our troops and the tranquility of the population of Rheims, the persons mentioned have been seized as hostages by the Commander of the German Army. These hostages will be shot if there is the least disorder. On the other hand, if the town remains perfectly calm and quiet, these hostages and inhabitants will be placed under the protection of the German Army'.

This is only one of a number of similar quotations found in this particular pamphlet, and its value is recognized by a teacher who has heard the questions following such a report.

Another topic of discussion particularly stimulating to those of us who teach girls is the changed position of woman. The Gallic woman with her streaming locks and outstretched hands, appealing to the sympathy of the Romans, seems very remote in point of view from her modern sister who farms, works in the munition factory, drives a car, and does the man's work in a delightfully independent way. Had the ancient Germans understood the capabilities of their women, it

would not have been necessary for the men to fight one year and stay at home the next.

Because our days are so full of the big things of life, it is imperative that we give to our pupils not only the best that is in the authors they are reading, but the best that can be read into them from the events of the present day.

These suggestions are only some of the numerous helps that are within reach of the teacher of Second Year Latin to-day.

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THE RÔLE OF THE CONCEPT OF INFINITY IN THE WORK OF LUCRETIUS¹

No doubt there will one day be written the history of the concept of infinity. If it is to be done by an American scholar, it will probably not be done in the present generation, for the doing of it calls for a kind of composite scholarly preparation—linguistic, historical, philosophical, scientific, and especially mathematical—which our American universities have indeed the machinery but not yet, it seems, the spirit or the purpose or the atmosphere or the temper to provide.

In any adequate historical survey of the rôle of the notion of infinity in our human thinking a consideration of the *De Rerum Natura* of Lucretius will have to be accorded the position of an important chapter. Most of the many great merits of the work have been long, if not generally nor even widely, recognized. One of its recognized merits is its superb daring and the unsurpassed magnificence of its enterprise; another is its probably unmatched union of literary excellence with scientific spirit and aim; still another, which includes many, being a highly composite merit, is its confident and often acutely argued presentation, sometimes in detail and sometimes in clear and striking outline, of ideas and doctrines that came into their own only in modern science. I refer to such concepts and dogmas as natural law, the atomic constitution of matter, the conservation of mass and of energy, organic evolution, spontaneous or chance variation of life forms, struggle for existence, survival of the fit, and sensation as the ultimate basis of knowledge and the ultimate test of reality, not to mention other equally brilliant anticipations of modern scientific thought.

In attempts to appraise the work of Lucretius his employment of the notion of infinity is commonly indicated, but only more or less incidentally. For example, in Masson's large volume, *Lucretius, Epicurean and Poet*, the term infinite has only a subordinate place in the index of important terms: in Munro's very extensive *Notes* the term receives but scant attention; and it receives even less in the *Notes*

found in Cyril Bailey's recent and deservedly much praised English translation of the poem. What is missed in such appreciations and commentaries and what I wish to signalize here is the fact that the concept of infinity—of infinite multitude and infinite magnitude—is not merely one among the many ideas, but is indeed the dominant idea, in the work of Lucretius. A critical examination of the work cannot fail to discover that in the author's judgment the concept in question was at once the most powerful of his instruments and the one most obviously indispensable to the success of his great undertaking. That undertaking was a pretty large contract, being nothing less than the endeavor to show forth a method by which it would be possible to explain, or to account for, all phenomena (whether mental or not) without having to resort to the hypothesis of divine intervention.

This is not the place to give a detailed account of the Lucretian principles and procedure. For the purpose of this note it is sufficient to point out that among the fundamental propositions there are three major propositions and that these owe their efficacy and their dominance of the entire discourse to the fact of their postulating the existence of infinite multitude and infinite magnitude. These propositions are that the universe of space is a region or room of infinite extent; that time is an infinite duration composed of an infinite past and an infinite future; and that the matter in the universe is composed of an infinite multitude of absolutely solid (non-porous) and non-decomposable atoms or 'seeds of things' always moving hither and thither in an infinite variety of ways and ever so distributed throughout the whole of space that of all spheres none but such as are microscopically minute could at any given instant fail to enclose one or more of the 'seeds'. Without these postulated infinities explanation of the phenomena of the world was, in the belief of Lucretius, impossible; with them, supplemented by certain other postulates, such explanation was possible. Though the mentioned postulates were not in themselves sufficient, they were regarded as conspicuously necessary. In the view of Lucretius cosmic history was an eternal drama enacted by an infinitude of unoriginated and indestructible elements operating upon an infinite stage. The drama was not to be understood except by help of the concept of infinity; and so the *De Rerum Natura* may be not unjustly said to be a kind of poetic celebration of what the author deemed to be the scientific efficacy of that concept.

What did Lucretius mean by infinity? What did he mean by an infinite multitude and by an infinite magnitude? No formal definition of any of these terms is to be found in his work. But it is perfectly clear that he conceived an infinite multitude of elements to be a multitude which could not be exhausted by removing from it one element at a time but which could be thought of as arranged in an endless succession of elements. In other words, an infinite multitude signified what we now describe as a denumerably

¹This paper was read before the American Mathematical Society, December 27, 1917, and was published in the *Bulletin of the American Mathematical Society*, in April, 1918 (= 24.321-327). It is reprinted here with the consent of its author, who is Professor of Mathematics in Columbia University, and of the *Bulletin of the American Mathematical Society*.
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